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EXAMINER	
MACARTHUR, SYLVIA	

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte ANTHONY J. RICCI, KEITH COMENDANT, and JAMES TAPPAN

Appeal 2019-001488
Application 14/340,083
Technology Center 1700

Before ROMULO H. DELMENDO, MICHAEL P. COLAIANNI, and N. WHITNEY WILSON, *Administrative Patent Judges*.

COLAIANNI, *Administrative Patent Judge*.

DECISION ON APPEAL

Pursuant to 35 U.S.C. § 134(a), Appellant[1] appeals from the Examiner's decision to reject claims 1 to 4 and 7 to 20. We have jurisdiction under 35 U.S.C. § 6(b).

We REVERSE.

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[1] We use the word "Appellant" to refer to "applicant" as defined in 37 C.F.R. § 1.42, which is listed as Lam Research Corporation. Application Data Sheet 4. Appellant identifies the real party in interest as Lam Research Corporation. App. Br. 3.

Appellant's invention is directed to substrates supports for achieving uniform temperature distribution on a substrate during plasma processing (Spec. ¶ 2; Claim 1).

Claim 1 is representative of the subject matter on appeal:

> 1. A substrate support for control of a temperature of a semiconductor substrate supported thereon during plasma processing of the semiconductor substrate comprising:
>
> a temperature-controlled base having a top surface;
>
> a metal plate;
>
> a film heater, the film heater being a thin and flexible polyimide heater film with a plurality of independently controlled resistive heating elements thermally coupled to an underside of the metal plate, the film heater being electrically insulated from the metal plate, and the metal plate having a thickness adequate to transfer a spatial pattern of the film heater to the semiconductor substrate;
>
> a first layer of adhesive bonding the metal plate and the film heater to the top surface of the temperature-controlled base; and
>
> a layer of dielectric material bonded to a top surface of the metal plate with a second layer of adhesive, the layer of dielectric material forming an electrostatic clamping mechanism for supporting the semiconductor substrate.

Appellant appeals the following rejections:

1. Claims 1–4, 7–13, 18, and 19 are rejected under pre-AIA 35 U.S.C. § 103(a) as unpatentable over Kholodenko (US 6,310,755 B1, issued Oct. 30, 2001) in view of Higashiura (US 2005/0236111 A1, published Oct. 27, 2005), Yoo (US 6,207,932 B1, issued Mar. 27, 2001), Ota (US 5,371,341, issued Dec. 6, 1994), and Schiller (US 3,411,122, issued Nov. 12, 1968).
2. Claims 14–17 and 20 are rejected under 35 U.S.C. § 103(a) as

unpatentable over Kholodenko in view of Higashiura, Yoo, Ota, Schiller, and DeLucia (US 4,455,462, issued June 19, 1984).

Appellant argues the claims as a group (App. Br. 6–21). Appellant relies on arguments made regarding rejection (1) in disputing rejection (2) (App. Br. 21). We focus on claim 1, which is the only independent claim on appeal.

FINDINGS OF FACT & ANALYSIS

The Examiner's findings and conclusions regarding the rejection of claim 1 over Kholodenko in view of Higashiura, Yoo, Ota, and Schiller are located on pages 3 to 5 of the Final Action.

Appellant argues that the combined teachings of Kholodenko and Higashiura would not have suggested using Higashiura's metal plate for Kholodenko's composite base 175 (App. Br. 13). We agree.

Kholodenko teaches an electrostatic chuck for use in plasma processes (col. 1, ll. 5–6). Kholodenko discloses that plasma processing involves high temperatures and erosive environments (col. 1, ll. 20–22). Kholodenko teaches that the high temperature requirement is met by using ceramic materials for the electrostatic chuck, but that it is difficult to attach the ceramic chuck to metal due to the difference in thermal expansion coefficients of the ceramic and metal that may cause thermal and mechanical stress resulting in ceramic material fracture or chipping (col. 1, ll. 27–34). Kholodenko teaches using composite material for the base made of a porous ceramic or carbon fiber (col. 5, ll. 30–47; col. 6, ll. 39–42). The ceramic material may be infiltrated with molten metal (col. 5, ll. 48–49). In other words, Kholodenko avoids using a plate made only of metal (i.e., a metal plate) as the base 175 due to the coefficient of thermal expansion problems.

Based upon these teachings in Kholodenko, the Examiner's finding that modifying Kholodenko's base 175 with Higashiura's metal plate 16 to enhance the temperature of the support further ensuring that the support is able to assist in the maintenance and control of the support and consequentially the wafer's temperature would have been contrary to the teaching of Kholodenko that leads away from the use of solely metal as the base layer (Final Act. 4). Even if using metal for the base would have provided a uniform wafer distribution, Kholodenko teaches that thermal expansion coefficient problems occur between the metal base and ceramic chuck (col. 1, ll. 27–34). The Examiner responds that metals have an inherent thermal expansion coefficient and the metal with an acceptable thermal expansion coefficient may have been selected (Ans. 13). This finding does not address Kholodenko's teaching to avoid metal and use a composite material for the base to permit tailoring the thermal expansion coefficient as argued by Appellants (Reply Br. 14). It appears that the Examiner's combination would have frustrated the purpose of Kholodenko.

On this record, we reverse the Examiner's § 103 rejections.

CONCLUSION

In summary:

Claims Rejected	Basis	Affirmed	Reversed
1–4, 7–13, 18, and 19	§ 103 Kholodenko in view of Higashiura,		1–4, 7–13, 18, and 19

Claims Rejected	**Basis**	**Affirmed**	**Reversed**
	Yoo, Ota, and Schiller		
14–17 and 20	§ 103 Kholodenko in view of Higashiura, Yoo, Ota, Schiller, and DeLucia		14–17 and 20
Overall Outcome			1–4 and 7–20

REVERSED